

Unlocking Virtualization: Facing IT, Business Realities

Analytics Report

While technical decision makers manage the application infrastructure, it's line-of-business managers and corporate executives who must sign off on the virtualization bill. No matter how excited IT may be about running critical apps in a virtualized environment, if performance doesn't match business objectives, everyone loses.

By Michael Biddick



TABLE OF CONTENTS

4	Author's Bio
5	Executive Summary
6	Research Synopsis
7	Virtualization Everywhere? Not Quite Yet
8	Under The Hood
8	Impact Assessment
9	Data Center Breakdown
14	Best Practices To Satisfy Business And IT
15	Rule 1: Control All Physical-To-Virtual Migrations
16	Rule 2: Implement Server Acquisition Process Improvements
17	Rule 3: Focus On Automation
18	Rule 4: Strive For Organizational Alignment
19	Lingering Concerns
28	Appendix

TABLE OF CONTENTS

7	Figure 1: Most Are Using Virtualization
9	Figure 2: Virtualization Used In Multiple Environments
10	Figure 3: Performance And Support Top Virtualization Setbacks
11	Figure 4: Performance Concerns Halt Use In Production
12	Figure 5: Nearly Half Use Tools For Conversion To Virtual
13	Figure 6: IT Drives Move To Virtualization
14	Figure 7: Largely A Three-Way Race
15	Figure 8: Virtualization Receives Balanced Support
16	Figure 9: Majority Use Tools To Manage Configuration
17	Figure 10: App Performance, Patch Management Lead Tools List
18	Figure 11: Most Use Both New And Existing Tools
19	Figure 12: Cost And Space Concerns Lead To Virtualization Path
20	Figure 13: Virtualization Has High Satisfaction Rate
21	Figure 14: Virtual Maintenance Same Or Less Than Physical
22	Figure 15: Technical Limitations Factor Into Delays
23	Figure 16: Virtualization Sprawl Is A Perceived Threat
24	Figure 17: Virtualization Claims Small Portion Of IT Budgets
25	Figure 18: Some Still Don't Require Virtualization
28	Figure 19: Role Of Decision Makers
28	Figure 20: Job Title
29	Figure 21: Annual Revenue
29	Figure 22: Number Of Employees
30	Figure 23: Industry



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Executive Summary

With its promise of radically reduced costs, space savings, increased provisioning speeds, and environmental benefits, virtualization on a large scale is a game-changing technology. Unfortunately, too many organizations will find these benefits out of reach unless they discover how to reconcile a virtual infrastructure with the realities of their operational environments. Otherwise, what guarantee is there that businesses can meet competitive objectives?

That's not a rhetorical question—if business technology professionals hope to extend use of virtual machines beyond labs and testing environments to reliably host critical production applications and perform large-scale server consolidation, we must come to grips with functions such as configuration management, performance monitoring, and capacity planning. Governance and systems management were required in traditional environments, and the rules have not suddenly changed just because our servers are now virtual.

To really transform an organization and take advantage of all the potential that virtualization has to offer, IT and business leaders must partner to tackle thorny management problems that have plagued us all—in some cases, for decades. Our poll of 348 business technology professionals touches on such areas as security and privacy, and in this report, we'll explore IT's ability to assure performance, stability, and availability of virtualized servers, and to provide SLA metrics back to business. We'll also examine the perceptions of IT decision makers running virtualized environments and see how well their objectives map to business drivers. A reality check on some of the expectations that are fueling the mad rush to virtualization reveals lingering concerns surrounding the technology, and we'll present best practices gleaned from our experience.

Research Synopsis

Survey Name: *InformationWeek* Analytics Virtualization Survey

Survey Date: November 2008

Region: North America

Number of Respondents: 348

Purpose:

To gauge the adoption and use of virtualization in enterprises.

Methodology:

InformationWeek Analytics surveyed business technology decisionmakers at North American companies. The survey was conducted online, and respondents were recruited via an e-mail invitation containing an embedded link to the survey. The e-mail invitation was sent to qualified *InformationWeek* subscribers.

Virtualization Everywhere? Not Quite Yet

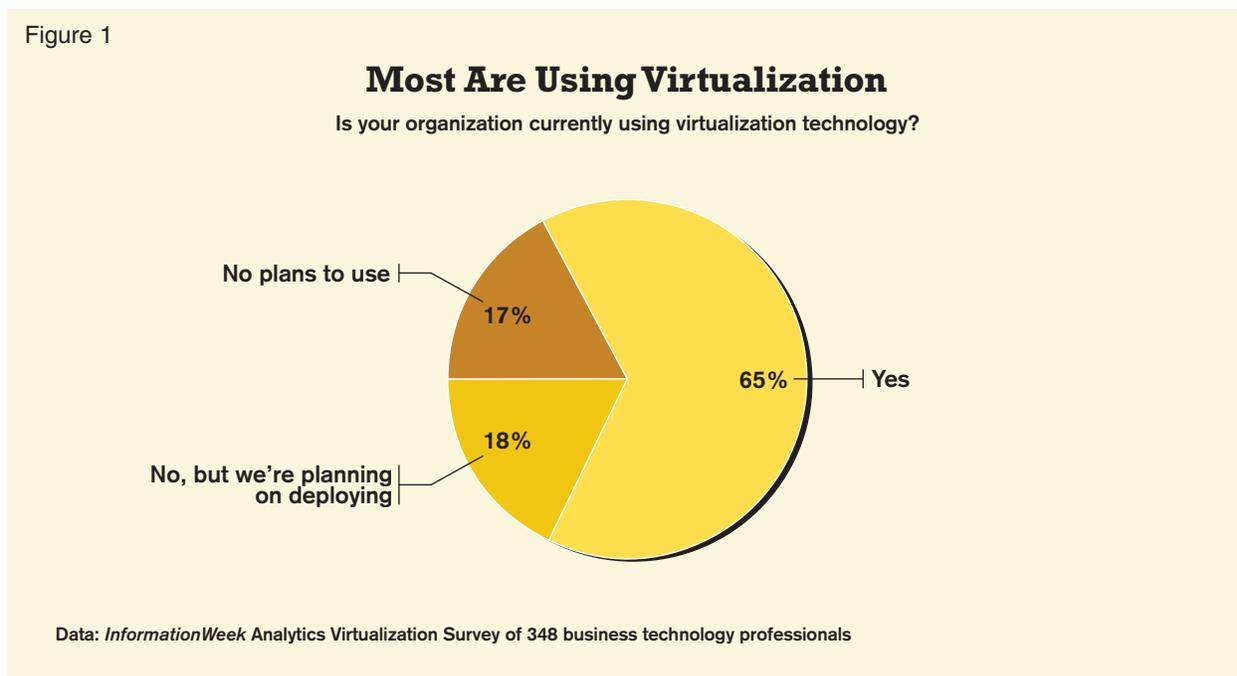
While IT's love affair with virtualization shows no sign of cooling, the level at which business leaders fund, get involved in—or even care about—the topic depends greatly on the types of organizations they're running, according to our survey of 348 business technology professionals from a wide range of industries.

We've seen it before: Forward-thinking CEOs understand that sometimes you need to spend money to save money. Yet, too often, poor execution squanders their goodwill and gives rise to frustration at the very initiatives about which technologists are the most enthusiastic. And IT is definitely upbeat about virtualization, with 73% reporting that the technology has met or exceeded their expectations. The key is to translate virtualization's benefits into metrics that business leaders can get their arms around. We'll discuss how to use best practices to do just that.

A few other key findings: 83% of respondents use VMware's server virtualization platform, while 35% employ Microsoft Hyper-V and 15% use Citrix XenServer. Seven in 10 agree that virtualization sprawl is a potential problem, and 66% use tools to manage the configuration and reliability of the applications running on their virtual environments.

While virtualization can benefit organizations of all sizes, those most likely to reap sizable rewards are sitting on massive data center investments. In today's tough economic reality, reducing operational expenses may be an act of survival for these enterprises, and they'll certainly realize the biggest savings. The more server hardware you own, the more virtualization helps. Companies that are under pressure to provide high availability or fast provisioning should also turn to virtualization to increase overall performance. Other organizations will need

Figure 1



to demonstrate a strong ROI to get buy-in for virtualization projects. That's as it should be, because running a variety of operating systems and mission-critical applications at the same time on a single physical server seems, on the surface, inherently risky, and business people are accustomed to making decisions based on balancing risk vs. reward. It's IT's job to educate, while executives must approach this new way of doing business with an open mind.

UNDER THE HOOD

Systems from all three primary virtualization vendors—Citrix, Microsoft, and VMware—place on the server hardware thin layers of software to create virtual machines. This software contains a virtual machine monitor, called a hypervisor, that dynamically allocates hardware resources, like CPU, memory, hard disk, and network controller, to operating systems as needed. The fundamental concept, which is the same whether you're virtualizing a single computer or a large cluster environment with hundreds of machines, is a separation of applications and operating systems from physical hardware. Each application/host virtual machine pair believes it has the physical server all to itself.

Virtualization provides greater flexibility in application design and can enhance efforts around development and testing. Gone are the days where developers had to wait for an engineering

Impact Assessment: Virtualization Of Critical Applications

	● Benefit	● Risk
IT Organization	○●●●●● Manage it right, and a virtualized infrastructure will reward you with faster and more consistent provisioning and a reduced attack surface—advantages that will benefit organizations of all sizes.	○●●●● The design elements that make server virtualization an attractive strategy for flexibility and cost savings introduce risks around VM sprawl, and the need for add-on management tools may erode savings.
Business Organization	○●●●● Server virtualization will shrink the costs of hardware and, more significantly, data center utilities and cooling, freeing up capital and operating budgets for other, more strategic, projects.	○●●●● Not all enterprise software vendors are working hard to adapt their wares for virtualized servers. Licensing can be confusing and costly, and custom in-house applications may not work well on a VM.
Business Competitiveness	○●●●● A pool of virtual data center capacity provides agility unimagined just a few years ago. IT can accommodate utilization spikes and minimize the impact of fluctuating energy costs while touting green cred.	○●●●● Organizations must weigh a large-scale virtualization project against new “cloud” data centers that offload the need to manage capacity and security. Evaluate costs and benefits carefully.
Bottom Line ○●●●● Modern server virtualization platforms take full advantage of the computing capacity of today's multiprocessor servers to squeeze maximum performance out of hardware and data center facilities investments. But moving mission-critical applications to virtual machines must be done thoughtfully and with sound performance management principles.		

Note: Number of dots indicates level of benefit and risk; one dot equals low benefit or risk, and five equals high benefit or risk

team to build their application environments. Now, we simply create the environment in a virtual machine and deploy it wherever it's needed, as many times as it's needed. This enables developers to much more rapidly code and test applications. Virtual machines are also portable. This means developers or software engineers can simply, and quickly, move entire environments with a few copy commands. It's no wonder, then, that virtualization is a hit with IT.

"Virtualization has allowed us to reduce servers from 22 down to two," says the director of IS at an energy services company. "It has positioned us to grow very quickly and has supplied our company with the infrastructure and technology to quickly recover in the event of a disaster." He adds that while saving energy was not a primary driver, the project has had a significant impact on the company's "green IT" message and has been well received by employees.

In fact, in our poll, we found that IT clearly drives the move to virtualization in 88% of the organizations surveyed. But will business leaders continue to foot the bill as money gets harder to come by? It seems likely. The positive coverage around virtualization has made an impression on most of the business leaders we're speaking with, and our poll indicates that 85% feel obtaining funding for virtualization projects is the same or easier compared with other IT initiatives.

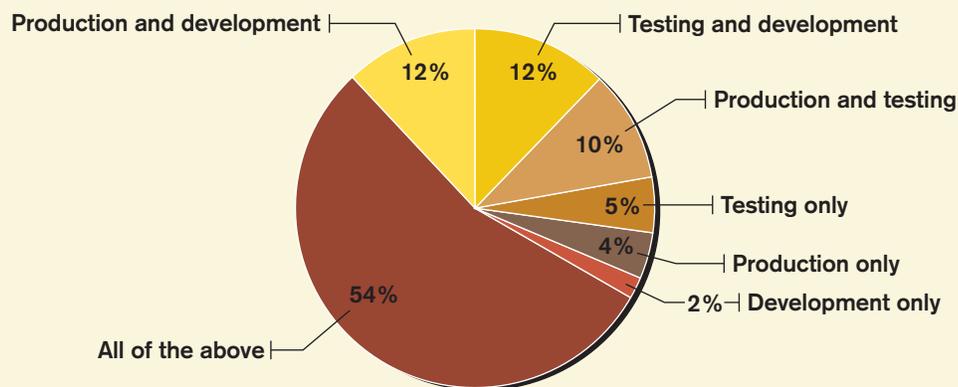
DATA CENTER BREAKDOWN

When organizations turn to virtualization, our poll found that the three primary drivers are cost savings, space savings, and increasing the speed to provision. There are other motivators, but our experience confirms that these three impel most deployments, and for good reason. Despite the economic downturn, and the corresponding drop in oil prices, energy costs will likely continue to eat away at IT budgets; in some shops, they may rise to almost half of overall expenses.

Figure 2

Virtualization Used In Multiple Environments

In which environments are you currently using virtualization technology?



Base: 226 respondents using virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

U.S. data centers consumed about 61 billion kilowatt hours in 2006, according to the EPA, at a total electricity cost of about \$4.5 billion. Today, in our experience, the annual utility bill for a 100,000-square-foot data center averages in the neighborhood of \$6 million; these costs include heating, cooling, and massive electric bills. In our recent Green IT Survey, just 25% said their data centers are able to take advantage of energy-efficient technologies; 21% said they'd need major modifications bordering on a complete redesign. Yet building a new 150,000-square-foot data center can cost over \$15 million. Even for small enterprises the cost to run, or just rent, data center space is growing at unsustainable rates.

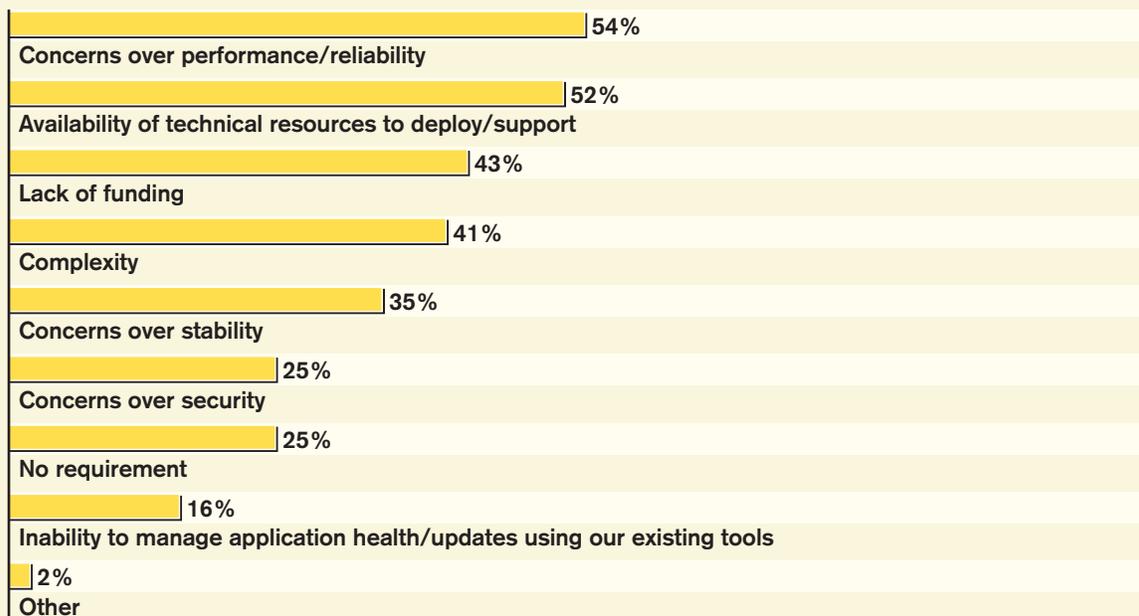
Because physical servers are the building blocks of the data center, there's no doubt moving to virtualization can dramatically reduce the number of devices consuming power, space, and energy. Microsoft offers an ROI tool on its site where IT can get a ballpark virtualization savings estimate and get you thinking about the areas that need to be considered; see microsoft.com/virtualization/tco-roi.msp.

From a green IT perspective, unfortunately, servers use one-third of their electricity while idle. While environmental concerns were not a driving goal of virtualization, ranking in the bottom half of our poll, the cost of electricity is a huge factor: As the average price of a new server

Figure 3

Performance And Support Top Virtualization Setbacks

Why hasn't virtualization been deployed yet within your organization?



Note: Multiple responses allowed

Base: 63 respondents planning to deploy virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

drops, we're actually seeing the cost to power these devices surpass the cost to purchase over a three-year period, according to a study by the American Society of Heating, Refrigerating and Air-Conditioning Engineers. Nationwide, IDC predicts the power and cooling bill for application servers could rise to over \$40 billion by 2010.

Clearly, these numbers are compelling, in a horror-movie kind of way. Enterprises forced to cut costs without impacting service quality must find ways to become more efficient, and virtualization fills that bill nicely.

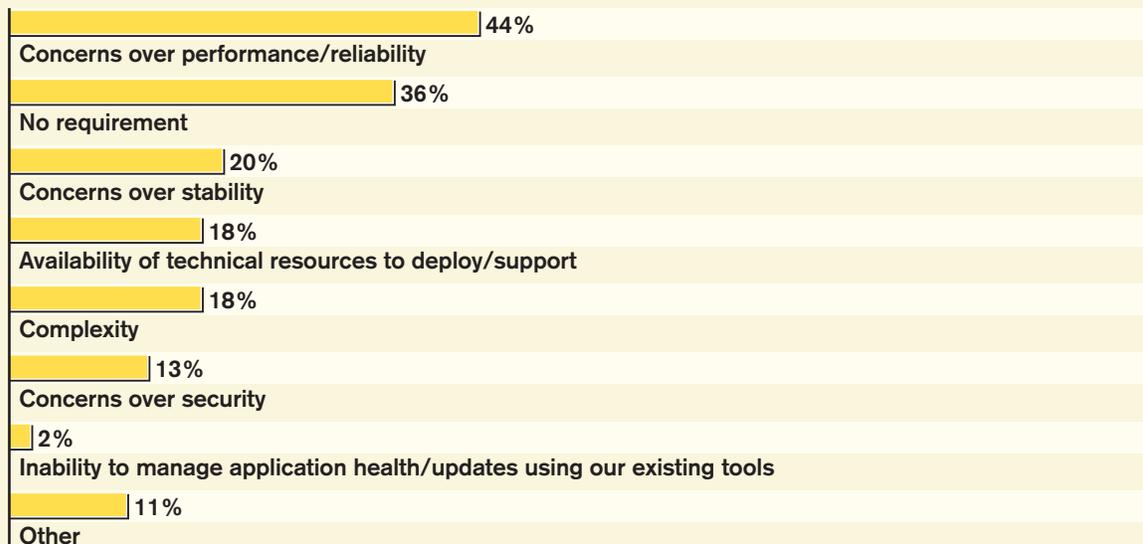
"We are two-plus years into hosting virtualization, with about 40% of our 450-unit data center computing power on virtualized servers," says Gary Osmondson, CIO for the County of Fresno, Calif. "Results thus far have been excellent and have resolved some longstanding hardware-to-application issues. We are still challenged in the cost recovery area, but that is falling in line as well. Overall, virtualization has been a success for us."

Consider: The number of virtual machines you can run per server varies based on the load imposed by the applications, but eight to 10 VMs per physical server is a realistic estimate. Keep in mind that running more VMs on physical hardware may require a robust server, so while energy savings will not be linear, they'll still be significant. Reducing server-related energy costs

Figure 4

Performance Concerns Halt Use In Production

Why aren't you using virtualization technology in a production environment?



Note: Multiple responses allowed

Base: 45 respondents not using virtualization technology in a production environment

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

can mean big money in large organizations. If rack space is at a premium, you may also reclaim space by eliminating physical servers and forgoing additional build-outs.

Some virtualization vendors point to about \$600 per year in cooling and electrical cost savings for every system that can be converted from a physical to a virtual setup. This also means almost 8,000 fewer kWh hours used, reducing CO2 emissions.

FAST, AND ALWAYS ON

While it came in third in our poll, we believe slashing the time it takes to deploy a server will be one of the most critical business factors driving the move to virtualization over the longer term. While small shops will see modest cost savings around energy usage, the ease with which new servers can be provisioned will impact companies of all sizes and may even be more pronounced when IT groups are small.

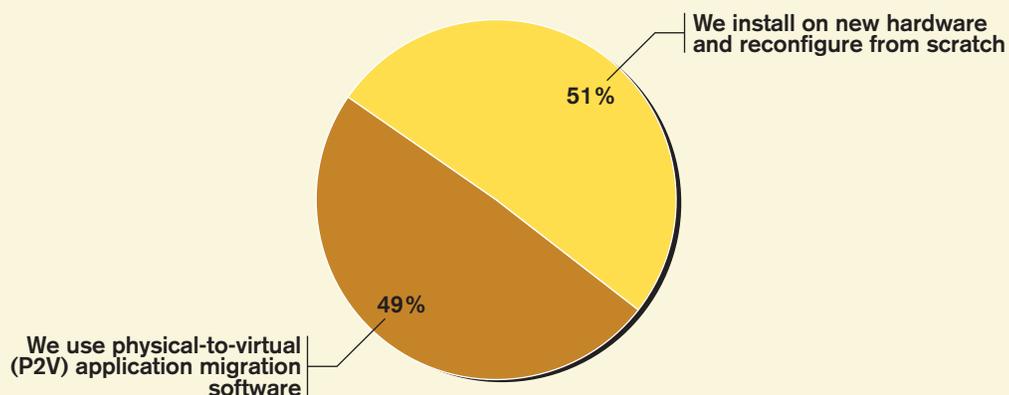
In one company we worked with, server provisioning regularly took three days, as IT dealt with physical hardware procurement, racking, building the operating system, and hardening the OS for security. With virtualization, the company could eliminate those steps and effectively provision a copy of any existing virtual server in seconds. Speed to provision means application developers gain access to the system faster. IT groups are freed up to focus on other tasks, and the potential for human errors resulting from disjointed manual steps is dramatically decreased. This has a particularly significant impact in organizations where efficiency and speed around application development are valued.

Business leaders may also look to virtualization to increase overall availability. Many organiza-

Figure 5

Nearly Half Use Tools For Conversion To Virtual

How do you convert physical applications to virtual ones?



Base: 181 respondents using virtualization technology in a production and/or testing or development environment
Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

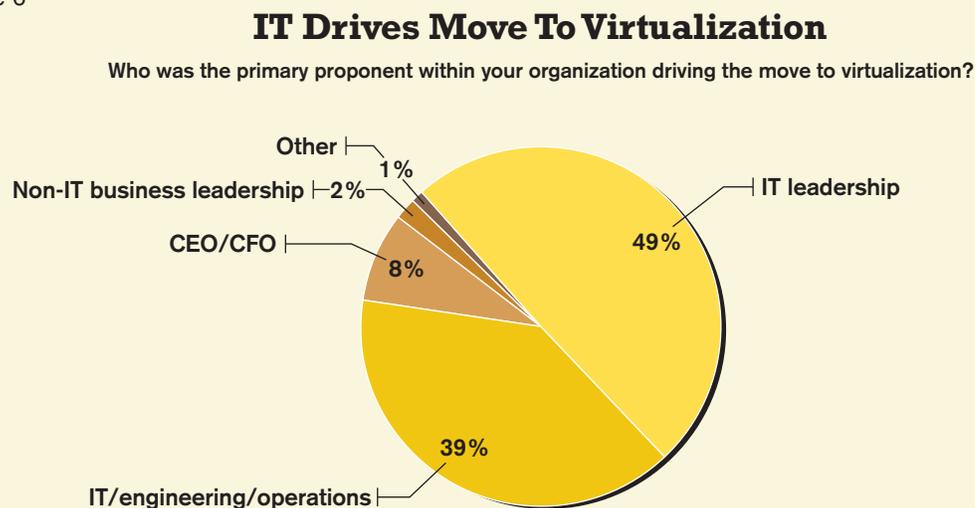
tions experience maintenance windows where core application services are not available. Virtualization can allow for planned hardware and OS upgrades with virtually no interruption in the application—and zero impact on customers and employees. Simply copy the system state while the application continues to run. It then is synchronized with the second virtual machine.

Besides being useful for planned outages, virtualization can also help increase availability of production applications during unplanned downtime. Achieving this higher level of application availability will likely be a motivator for business leaders.

Virtualization vendors focus on maintaining hardware availability by supplying IT with the ability to restart virtual machines on alternate hardware if a host system fails. When performance must be assured, companies can set thresholds and dynamically reassign the application load to higher-capacity servers, before a resource issue degrades service or impacts an SLA.

With additional monitoring tools, organizations may also ensure that applications running on virtualized servers exhibit a consistent level of availability. As more apps support a virtual architecture, this functionality has the potential to eliminate customer-impacting application slow-downs or outages. The key is proper instrumentation of threshold levels, as well as a solid business process to deal with the outage or cause of a performance problem. VMware's VMotion migration software, for example, allows virtual machines to be provisioned to other physical servers to provide not only high availability but load balancing, and also a level of protection should indicators reveal a potential hardware failure.

Figure 6



Base: 226 respondents using virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

BEST PRACTICES TO SATISFY BUSINESS AND IT

Nearly half of the respondents to our poll say technical limitations may prevent full migration of enterprise applications to virtualized servers. Challenges include governance issues, orderly VM deployment strategies, and application support.

“One of the major challenges we face in our organization is gaining vendor support for installing software on a virtualized environment,” says one poll respondent. “We get a lot of push back from the vendor that that type of configuration is ‘unsupported.’ This forces our organization to maintain two environments, physical and virtual.”

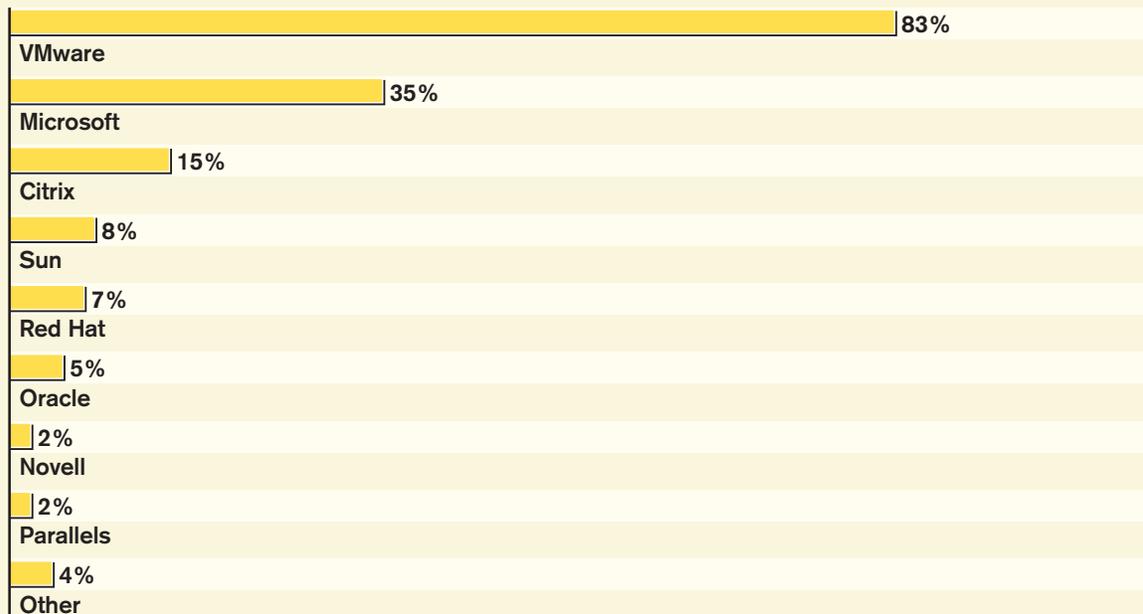
This meshes with what we’re seeing in the field, and yet, 72% of our poll respondents say their virtualization initiatives have met or exceeded expectations. Does that mean we’re setting our sights too low? Perhaps, but we believe it’s more likely that CIOs have gotten smart about communicating to IT that meeting business needs is the top priority.

In response, virtualization specialists have put in place some best practices around migration and server acquisition governance, automation, and operational alignment. Following their lead can ensure that your project doesn’t backfire, resulting in the evaporation of hard-won funding.

Figure 7

Largely A Three-Way Race

Which virtualization technologies are you using?



Note: Multiple responses allowed

Base: 226 respondents using virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

RULE 1: CONTROL ALL PHYSICAL-TO-VIRTUAL MIGRATIONS

Our poll and discussions with clients and respondents indicate that vendors still have further to go in convincing organizations that the payoff of moving their production environments to virtual machines is worth the risk. In fact, the actual conversion from physical to virtual is one of the toughest challenges many face. One respondent told us that his company's inventory management software ran poorly when moved to a virtualized server. "Performance was deeply degraded," he says. "We had to abandon after a few days."

Even if your application vendors say they support virtual platforms, unexpected problems may manifest within a virtual environment. Using physical-to-virtual (P2V) tools can help mitigate the risks of slow or failed implementations. Yet our poll was evenly split over whether it makes sense to use a specialized P2V conversion tool, such as Cirba or Vizioncore vConverter, to make the transition.

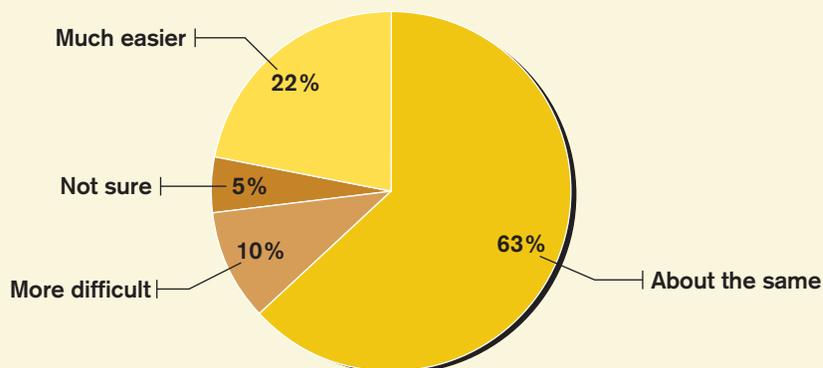
Our take: An improperly performed P2V conversion of just one high-profile application can put the entire virtualization project at risk. And the likelihood of problems increases exponentially if the team doing the move is not fully versed in the virtualization platform. One key area to focus on is access to resources. Some applications are extremely demanding during peak loads, drawing significant memory, CPU, or network resources. Balancing the needs of multiple applications running on one physical server is both art and science.

Regardless of whether a P2V tool is used, organizations that meticulously plan all aspects of their physical-to-virtual migrations will be the most successful; still, not all problems can be anticipated. At one engagement, for example, we worked with an organization that had been

Figure 8

Virtualization Receives Balanced Support

Compared with other initiatives, how would you rate the ability to allocate funding and gain organizational support for virtualization?



Base: 226 respondents using virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

excited to move its application configuration management system to a virtual environment. The vendor supported virtualization, so everything should have been smooth sailing, right? After a new installation of the software in the virtual environment, IT migrated configuration data. Application performance took a nosedive. After several weeks of troubleshooting, we found some unique memory configuration requirements that were not documented. While a P2V tool may have found these, and we eventually worked through the issue, this could have been a show stopper for the company's move to virtualization.

Lessons: Draw up a detailed roadmap, migrate, and then test critical apps thoroughly before moving to the next stage to isolate problems. Prepare IT and business stakeholders for bumps in the road so that your virtualization initiative isn't derailed.

RULE 2: IMPLEMENT SERVER ACQUISITION PROCESS IMPROVEMENTS

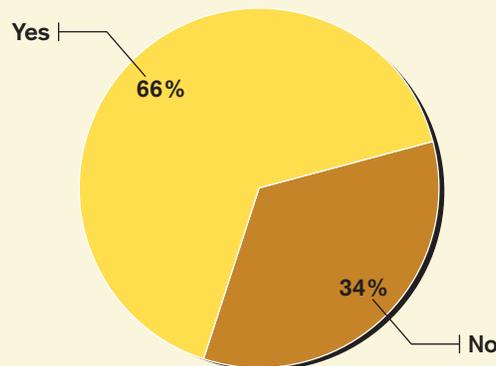
To realize the full benefit of virtualization, you must change the mindset of IT and business leaders accustomed to purchasing physical servers by the pallet load and seeing a vast and comforting sea of blinking lights in the data center. Prior to approving any additional hardware purchases, clearly understand your current inventory and available capacity, and justify why additional servers are required.

Given dropping hardware prices, this is a more difficult transition than you might expect. After the initial glow of a virtualization project wears off, it's all too easy to slide back into old habits. Without a vigorous process in place, servers may continue to be used in place of the virtual architecture.

Figure 9

Majority Use Tools To Manage Configuration

Are you using tools to manage configuration and reliability of the applications running on your virtual environment?



Base: 226 respondents using virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

Making this process even more challenging is the often-distributed purchasing process that exists in many organizations, and the failure to identify server components in overall project planning. Software vendors or integrators may provide bundled pricing, and few have fully made the transition to offering a virtual package. Working through this process could slow the time to deploy applications until a full philosophical shift occurs.

Business leaders can be part of this problem too. They won't be able to go into the data center and see the shiny new servers bought just for their applications, as may have been the case prior to virtualization. Instead they have to trust that IT will deliver the performance and availability they need from a virtual pool. Having more metrics and KPIs around the performance of applications should help ease managers' concerns over the move to virtualization.

Lesson: Purchasing discipline will be required to achieve long-term virtualization migration success.

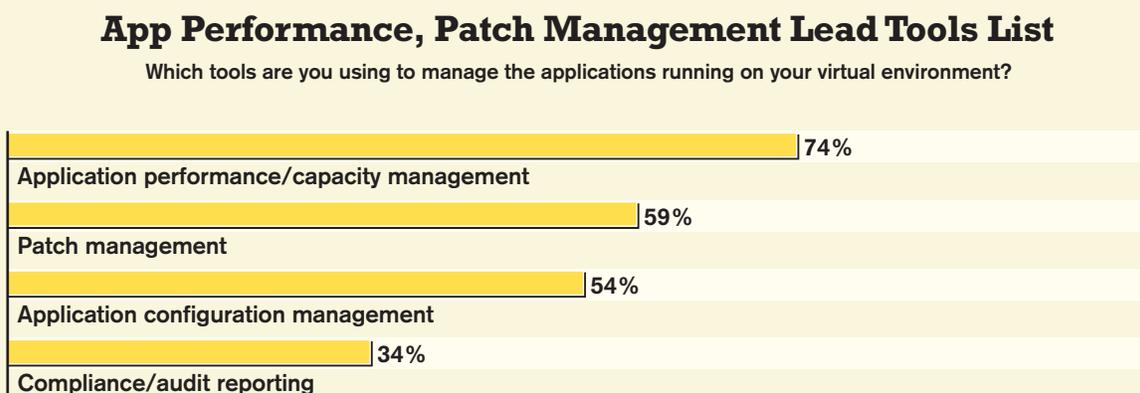
RULE 3: FOCUS ON AUTOMATION

What few have fully realized is that for virtualization to be successful, the organization must embrace automation. And to embrace automation, defined processes are required so that you know what can be automated.

Saying "business is complicated" sounds trite, but the fact is, many of today's operations span the globe and must adhere to a laundry list of regulations—a list that is likely to get even longer. While the intent of regulations to make business more responsible, the consequence is ever more complexity and focus on compliance and reporting. Without process, the IT environment will be a reactive nightmare and incredibly risky for business leaders.

Luckily, best-practices frameworks such as ITIL are available to help organizations design

Figure 10



Note: Multiple responses allowed

Base: 147 respondents using tools to manage applications running on virtual environment

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

process improvement initiatives. Still, without automation, the cost to comply and manage a diverse IT environment will spiral out of all proportion. So, pragmatic leaders will look at virtualization as an enabling technology, but also realize that it's only one part of the puzzle.

Virtualization can also help automate a diverse slate of tasks, tackling the other massive cost of running a data center—people. With the ability to automate new-server provisioning, people no longer have to spec, order, and rack hardware. As space fills up, people no longer need to reallocate servers. When performance issues occur, people no longer need to figure out why users are calling. This may sound like a pipe dream, but the technology is there to achieve these goals. In our poll, one-third of respondents say their virtualized servers take less time to manage compared with physical devices. Combine that reality with ubiquitous process and automation, and this percentage has the potential to skyrocket.

Lesson: Virtualization must be combined with process and automation or you'll leave efficiency gains on the table.

RULE 4: STRIVE FOR ORGANIZATIONAL ALIGNMENT

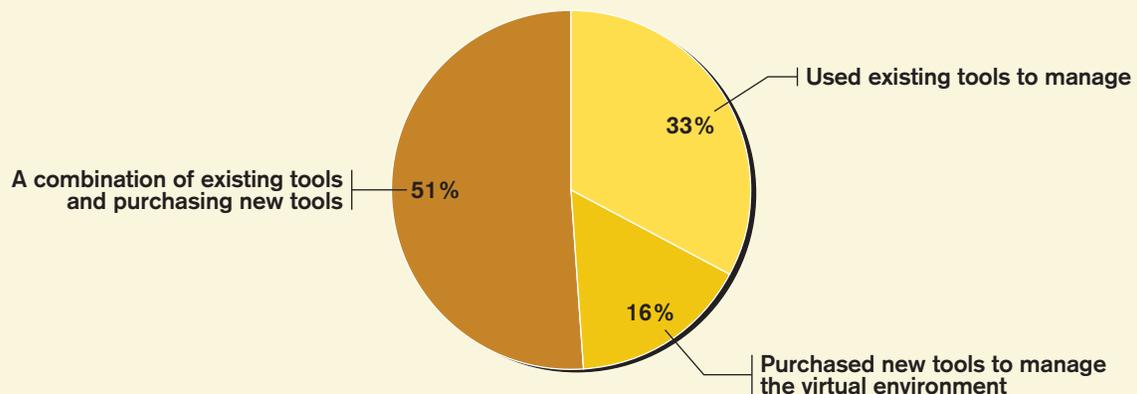
For virtualization to be successful, business and IT leaders must be synchronized on the value. Top-down sponsorship is key because virtualization involves diverse processes and levels of the organization. Like any transformational system, virtualization as an architecture needs to be discussed and agreed to before work on deployment commences.

A phased deployment is critical; bite off phases of the project and look to particular applications to virtualization, in contrast with a complete application migration strategy across the enterprise.

Figure 11

Most Use Both New And Existing Tools

Are you using existing products, or did you need to purchase new tools to perform these functions in a virtual environment?



Base: 147 respondents using tools to manage applications running on virtual environment
Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

Given the educational investment needed to take advantage of advanced virtualization capabilities, it's also important to consider how the system will be supported and virtualization skills acquired by internal staff. With P2V tools, IT can effectively plan the stages of the rollout and support the virtual infrastructure. In many successful environments, we have seen dedicated virtualization support individuals or teams that serve as a resource to all of the engineering and operations groups within the organization. Aside from training, it's important that the team has practical experience with virtualization and VM management tools in a production environment.

Lessons: Get high-level executives on board upfront because virtualization touches all corners of the organization. Don't skimp on staff education.

LINGERING CONCERNS

While the best practices we've discussed will ease the transition to virtualization and capture some of those benefits vital to keeping business leaders focused on supporting the initiative, there are lingering issues that must be addressed:

Application support: It's a huge frustration that not all enterprise applications are currently supported in virtual environments.

"While virtualization is a great idea for managing energy and space utilization, it leaves a lot to be desired in the performance space," says one poll respondent. "In our application environ-

Figure 12

Cost And Space Concerns Lead To Virtualization Path

How much of a role did the following goals play in your organization's decision to implement virtualization?
Please rank them from 1 to 10, where 1 is "a primary motivator" and 10 is "not a factor."

	Rank
Reduce cost Primary motivator	1
Save space	2
Speed to provision	3
Improve server utilization	4
Improve manageability	5
Reduce energy consumption	6
Support legacy applications on new hardware	7
Provide a flexible test environment	8
Improve security	9
Improve usage accounting Not a factor	10

Base: 226 respondents using virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

ment, the majority of our products do not fit well within the ideal virtual configurations when determining CPU and memory needs.”

Having an understanding of this state of affairs is critical to properly set expectations with business leaders. Achieving promised massive savings and increased application availability assumes that all of your applications, and components of those applications, can be migrated.

Worse still, organizations that are running custom applications may not have the cycles to test them rigorously in a virtual environment.

Over time, this will change as virtualization platforms mature. But for now, IT managers must ensure they map all of their applications and verify that they’re supported in a virtual environment. It’s useful to collect known-issue lists from vendors describing anomalous behaviors or specific configuration settings for production applications in virtual environments.

Using virtual machines in a development or lab setting may provide a false sense of security, if the testbed does not exactly mirror the production environment. In our experience, for many applications, this is a problem.

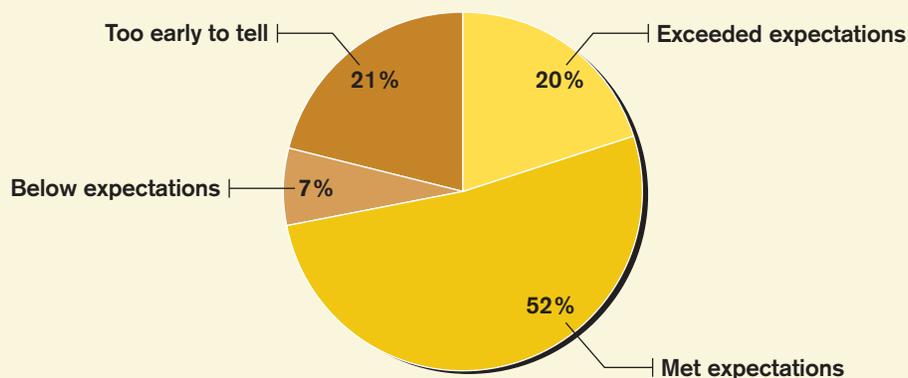
If you have not yet virtualized production systems, remember you will be inserting variables that might cause you to miss an application problem, since the development site does not match the actual virtual environment.

As to whether enterprise software vendors are making a sincere effort to ensure their products

Figure 13

Virtualization Has High Satisfaction Rate

Has virtualization exceeded, met, or been below your expectations? Or, is it too early to tell?



Base: 226 respondents using virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

work well on VMs, we're seeing a mixed bag. While many are releasing versions of their products tailored for virtual environments, they're not moving quickly, and licensing can be confusing. Interestingly, however, the tolerance level from users and vendors alike around virtualization-related issues seems higher than with traditional physical deployments.

Hidden costs: Virtualization may produce substantial long-term savings, but there's often substantial upfront investment. Aside from the cost to purchase the virtualization platform, add-on tools that aid configuration or high availability are frequently required. These tools may come from the virtualization vendor, or external software providers.

In addition, the effort to migrate physical applications is not trivial. Specialized software may be required to transfer applications and ensure that they perform as they did on physical machines. If you do not possess baseline performance metrics around your applications, it may be difficult to configure virtual machines, and you'll likely require more time, money, and effort to get this data prior to migration.

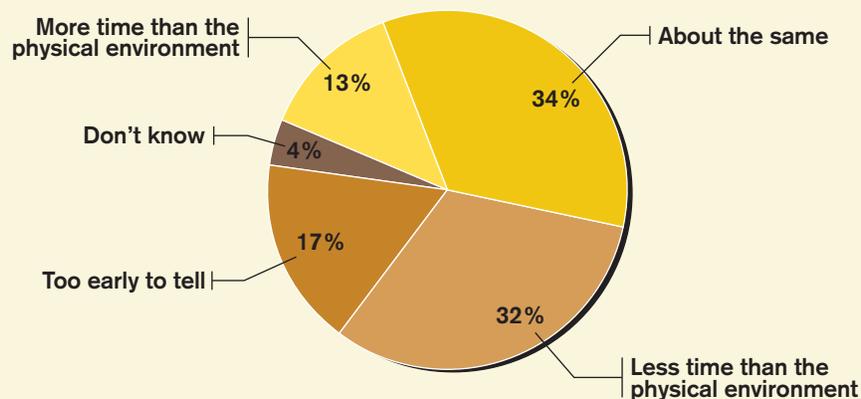
The staff to maintain the virtualization layer also must be accounted for. Our poll also found that, among organizations that have not yet deployed virtualization but plan to, over half say that's a result of a lack of staff to provide configuration and support. A virtualized architecture is quite different from a physical server architecture. Significant training is needed to take full advantage of the technology. Virtualization is an easy platform to get some baseline knowledge on, but when it comes to migrating production applications, do not trust novices.

To ensure business leaders don't get sticker shock, map all expected initial and ongoing costs

Figure 14

Virtual Maintenance Same Or Less Than Physical

Compared with the physical environment, how much time is spent maintaining the virtual environment?



Base: 226 respondents using virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

around virtualization and compare them to your reasons for migrating. The numbers need to add up and make sense.

Operational reality: How will IT deal with application management in a virtual environment? Keeping systems humming along requires an understanding of application complexity and a number of dependent components, including system-level CPU utilization, network performance, database latency, and client issues—all that can have adverse affects on an application.

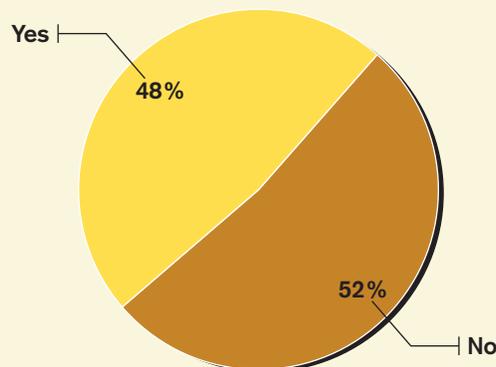
In our experience, while many organizations monitor some of these components, few have the visibility into complex interrelationships needed to decipher the impact a performance problem in one area has on the whole system. And yet, virtualization injects new dynamics into this already complex challenge—something our poll respondents understand. Concern about performance and the unknown is a leading reason that organizations hesitate in placing applications in a virtual environment. This is especially true for mission-critical systems. Our poll found that 44% of those who have not deployed virtualization in production say performance concerns are a major inhibitor.

Unfortunately, then, traditional application performance monitoring systems using SNMP polling or application agents are ill-equipped to manage this next-generation architecture. Deploying monitoring agents on each virtual machine instance will cause a massive case of agent sprawl, resulting in excess overhead and higher costs. Running five virtualized applications on a physical machine? Do you want to install five sets of agents on that box? Not likely. While you can gather metrics from your hardware, that really will not get you specific applica-

Figure 15

Technical Limitations Factor Into Delays

Are there any technical limitations with the virtualization environment that are causing you to delay moving additional applications to the platform?



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tion information on the true performance an end user or customer is experiencing.

For organizations on the verge of moving virtualization into a production environment, now is the time to plan an overall operations strategy that will leverage existing investments in monitoring and management tools, while ensuring that you can gain the visibility required. Most enterprises already have application performance management in place, and many have invested heavily in gaining end-to-end visibility. Few want to throw that away with virtualization. The result is IT groups intrigued with virtualization, but loath to make the leap with vital applications—thus, consolidation happens for production systems, just not mission-critical ones.

For those with application performance management software in place, what changes with virtualization? If you're using synthetic transaction application tools, they will not need to be virtual-machine aware. They will continue to monitor applications and report on overall performance the same way they do now. If you are using agent-based technology, you will need to reinstall and configure your agents in the virtual machine. For each virtual machine, you will need a set of agents installed. If you are combining metrics from the application and the operating system, again, you need agents in each virtual machine. Passive network-packet-capture systems will still collect the same information they do today.

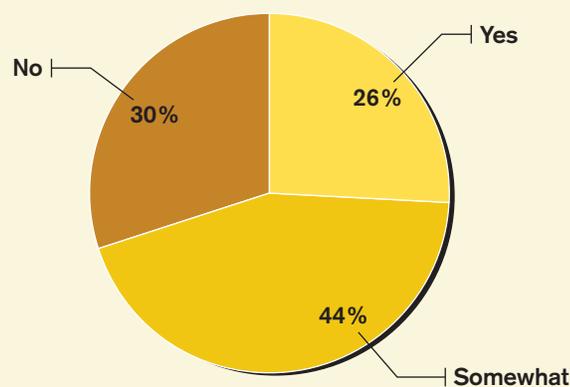
The issue with all of these approaches, however, is the lack of visibility into the health of the physical machine and the performance of the virtual machine.

From an application performance perspective, the virtual machine is like an additional operating system layer that can affect the overall performance of the system. Without virtual machine

Figure 16

Virtualization Sprawl Is A Perceived Threat

Are you concerned about virtualization sprawl (the spread of virtualization without proper inventory management)?



Base: 226 respondents using virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

monitoring, your application performance management tools will be less effective. To truly get a handle on application performance management for virtual machine applications, you need tools that can monitor and manage VMs and also correlate data from the overall infrastructure, or feed that data into a separate application performance management system.

IT managers also need to drill down into specific faults and performance issues. As apps move across different physical servers, or even network segments, tracking state—where the application was, physically, when the issue occurred—can be tough. Even more challenging will be drilling down to specific physical servers, applications, or processes to locate components that are causing performance issues.

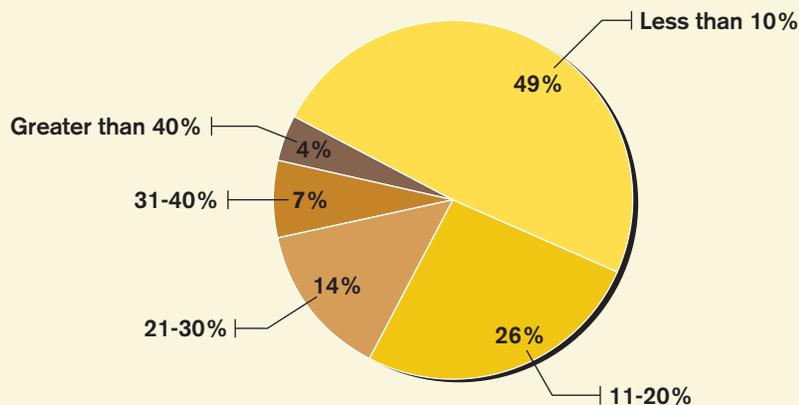
Our poll respondents are going down the right path, with three in four indicating that application performance/capacity management tools are a focus for their virtual environments. Still, detecting specific root causes of performance problems and quickly assigning responsibility for remediation will be difficult for many. Business leaders have scant patience with delays caused by triage conference calls and finger pointing linked to virtualization.

Service visibility: Aside from performance issues, business leaders need to ensure that visibility exists across the entire infrastructure so that they can quickly determine what is going wrong, where the issues are, who is impacted, and how the organization is affected. In our poll, only one third say they're able to use existing tools to manage their virtual infrastructures. While the capabilities of virtualization may be compelling, it risks creating another IT silo that is difficult to manage. Business leaders will quickly become frustrated if the virtual environment becomes a black box, with limited visibility.

Figure 17

Virtualization Claims Small Portion Of IT Budgets

How much of your overall IT budget does/will your organization devote to virtualization technology?



Base: 226 respondents using virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

Critical for both technologists and business leaders is the relationships between IT components, both physical and virtual, and how they impact business services. A reasonable end result is a unified dashboard that displays the overall health of IT services and a holistic view of the IT environment in real time and from a historical view. IT managers need to be able to control change, manage capacity, and examine health seamlessly across the environment, physical and virtual.

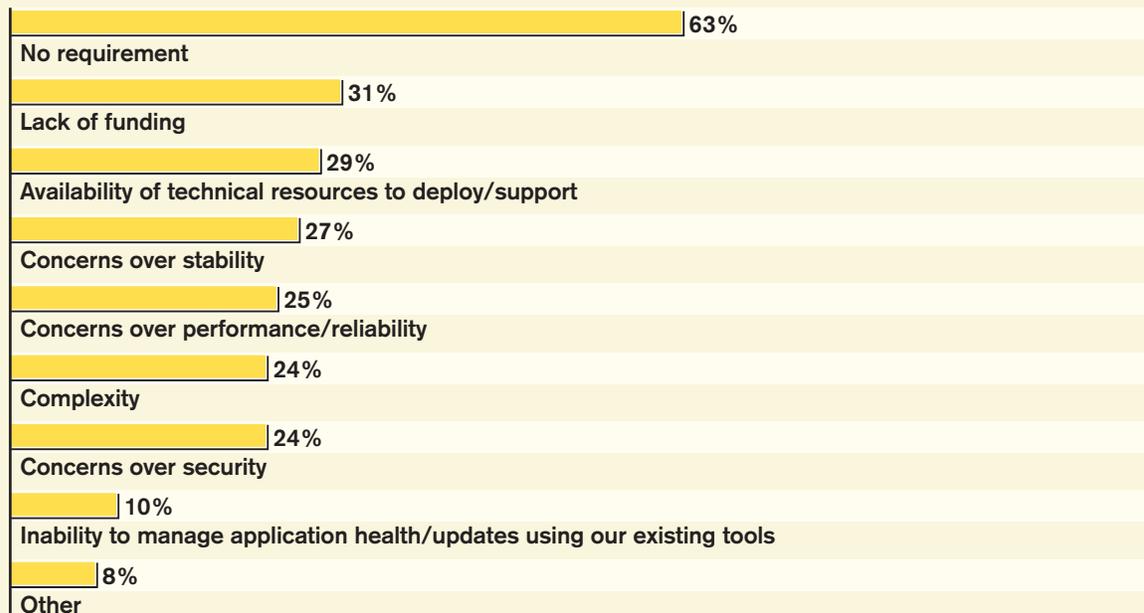
The ability to obtain key performance indicators and service-level agreement validation is critical. If IT is not able to deliver robust reporting and monitoring across all of its systems, business leaders will get nervous. In our poll, over one-third of respondents say they are not using dedicated tools for managing the virtual environment. For those who do, there is a focus on performance, with only 54% tackling configuration management. Change management is another critical area that merits attention.

Sprawl: In our poll, 70% cite concerns over virtualization sprawl, the unchecked deployment of virtual machines. They're right to worry. Given the ease with which we can set up and configure virtual environments, a disciplined process is required to ensure that the IT organization maintains control over what virtual machines exist and what functions they serve. We see far too

Figure 18

Some Still Don't Require Virtualization

Why aren't you using virtualization technology?



Note: Multiple responses allowed

Base: 59 respondents with no plans to deploy virtualization technology

Data: InformationWeek Analytics Virtualization Survey of 348 business technology professionals

many cases where engineers will not take the time to fully utilize physical servers, and instead install one or two virtual environments on a physical machine and move on.

Where's the savings there?

With Web services and SOA-based applications in particular, virtual machines may be spread across clients and servers and rely on different network, server, and database infrastructures. As virtualization spreads, maintaining an understanding of these relationships will be critical, otherwise, IT will quickly lose control. For some organizations, it is much too easy to move virtual machines around with no rhyme nor reason.

New tool requirements: When it comes to managing a virtual environment, your current toolbox may not cut it. Adding to the frustration, too many vendors are offering a dazzling array of point products that address narrow aspects of the virtualization management challenge, or support just a single platform, like VMware. Few software management vendors take a holistic approach.

While VMware has a majority of the market now, we expect most organizations to add virtualization platforms from Microsoft, Citrix, Sun, or a combination of these to the mix. The last thing anyone wants is another silo management platform that works only with a single proprietary product. Experienced CIOs have been down that road once, and won't be fooled again.

Like monitoring systems that focus solely on physical devices, application performance management products that are virtualization-aware understand all of the underlying infrastructure components in your environment and mirror the end user experience. Real-time mapping of application relationships, including virtualization and the overall topology, is crucial in providing a root-cause analysis that includes network, operating system, and application-tier data. For real value to the organization, approaches to application performance management should locate and predict performance problems across all components of the application and supporting infrastructure, including system, network, and virtual performance. They must diagnose the underlying problem and suggest or take corrective action before slowdowns impact the user community.

Unfortunately, few vendors can provide this level of visibility today. Some, like CA and Microsoft, are focusing on cross-platform monitoring. Microsoft System Center, for example, manages physical and virtual assets across the full application and OS, including multiple hypervisors from VMware, Microsoft, and Citrix. It allows IT to manage its virtual and physical environments with equal levels of granularity and uses common deployment, provisioning, monitoring, and backup methodologies. CA's ASM also provides cross-platform monitoring of virtual and physical environments.

Those who don't yet have a handle on application performance management may want to delay a large-scale move to virtualization and focus first on getting a handle on their physical environments. If you don't fully understand the performance requirements and impact that utilization has on your applications, start working toward that goal and then consider virtualization. Anything short of that level of understanding could lead to disastrous results.

Security: Finally, critics of virtualization have pointed to worries about security breaches and the potential for holes across virtualized operating systems. However, our poll indicates that only 25% of those planning to deploy virtualization think this is a significant concern. These dangers may exist, but they don't present a greater risk than a poorly implemented physical security policy. While hypervisor attacks are something to be aware of, security should not be a significant barrier to rolling out virtualization.

In fact, while having multiple applications on a single physical host may be frightening for some—the “all your eggs in one basket” syndrome—it may actually increase security by enabling standard policies across virtual environments. By isolating applications within VMs, virtualization can limit the impact viruses or malware may have on an application. When you separate the operating system from the hardware, you may also increase the speed with which you can patch systems.

Appendix

Figure 19

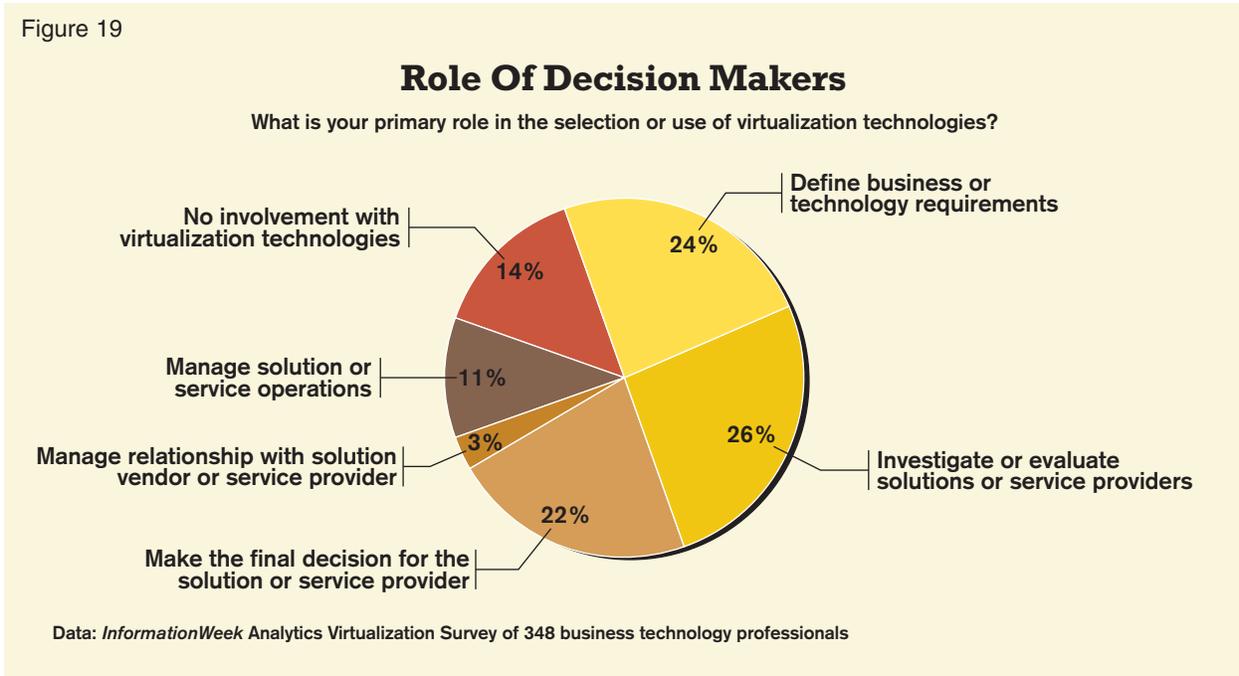


Figure 20

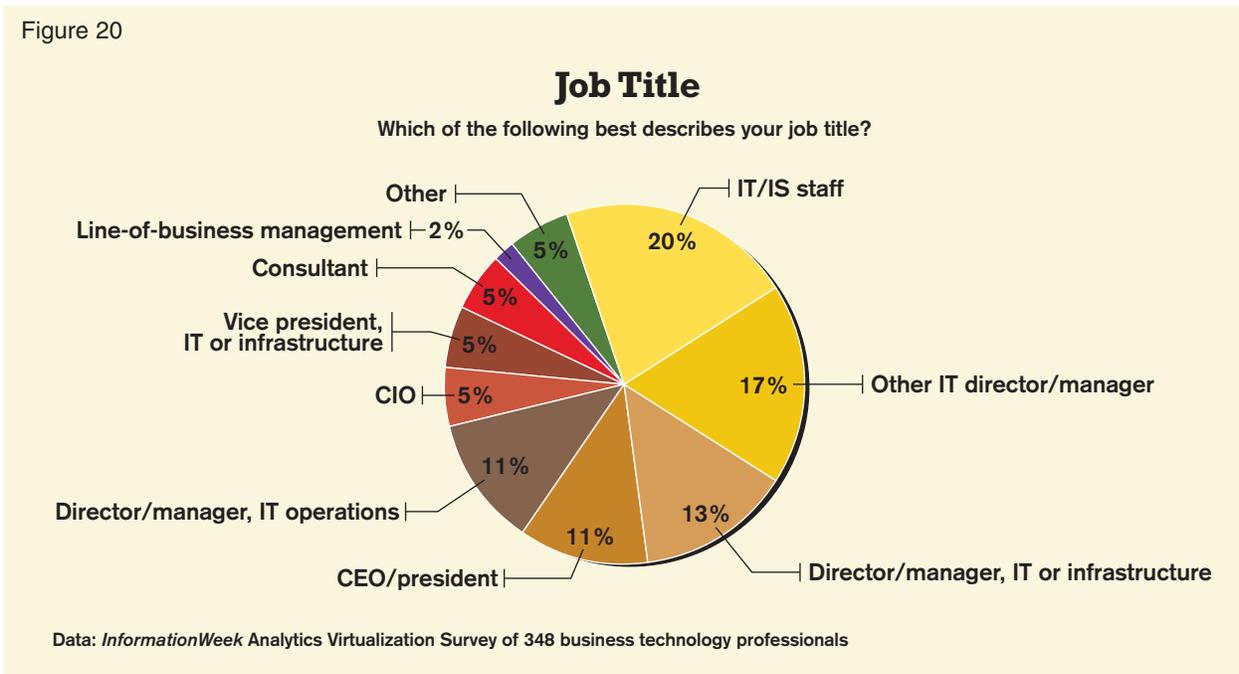


Figure 21

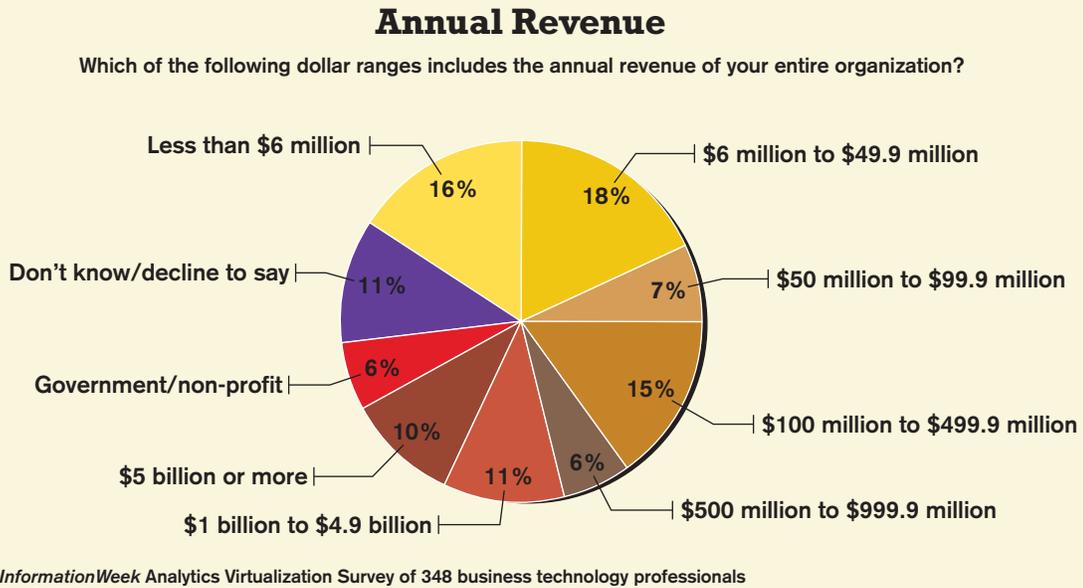


Figure 22

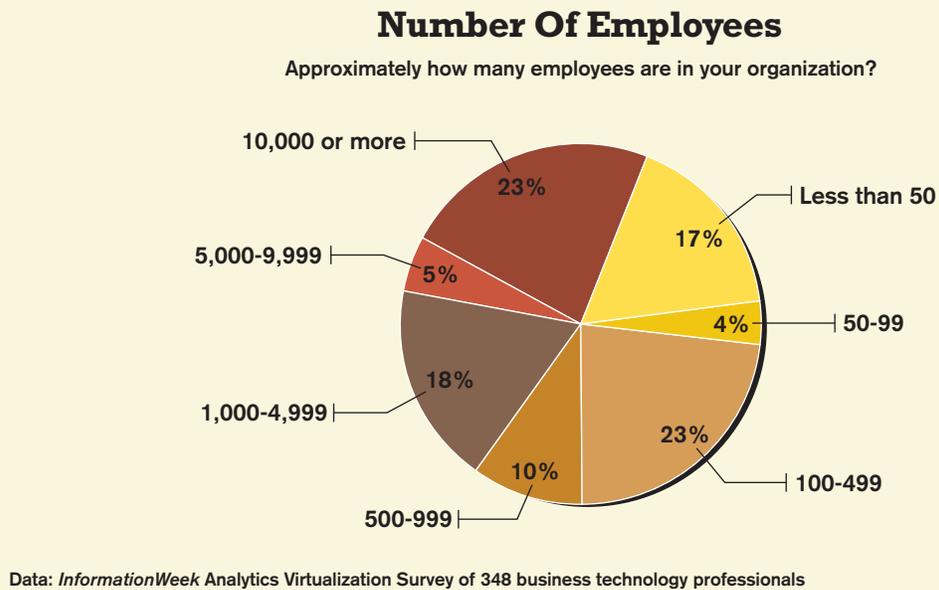
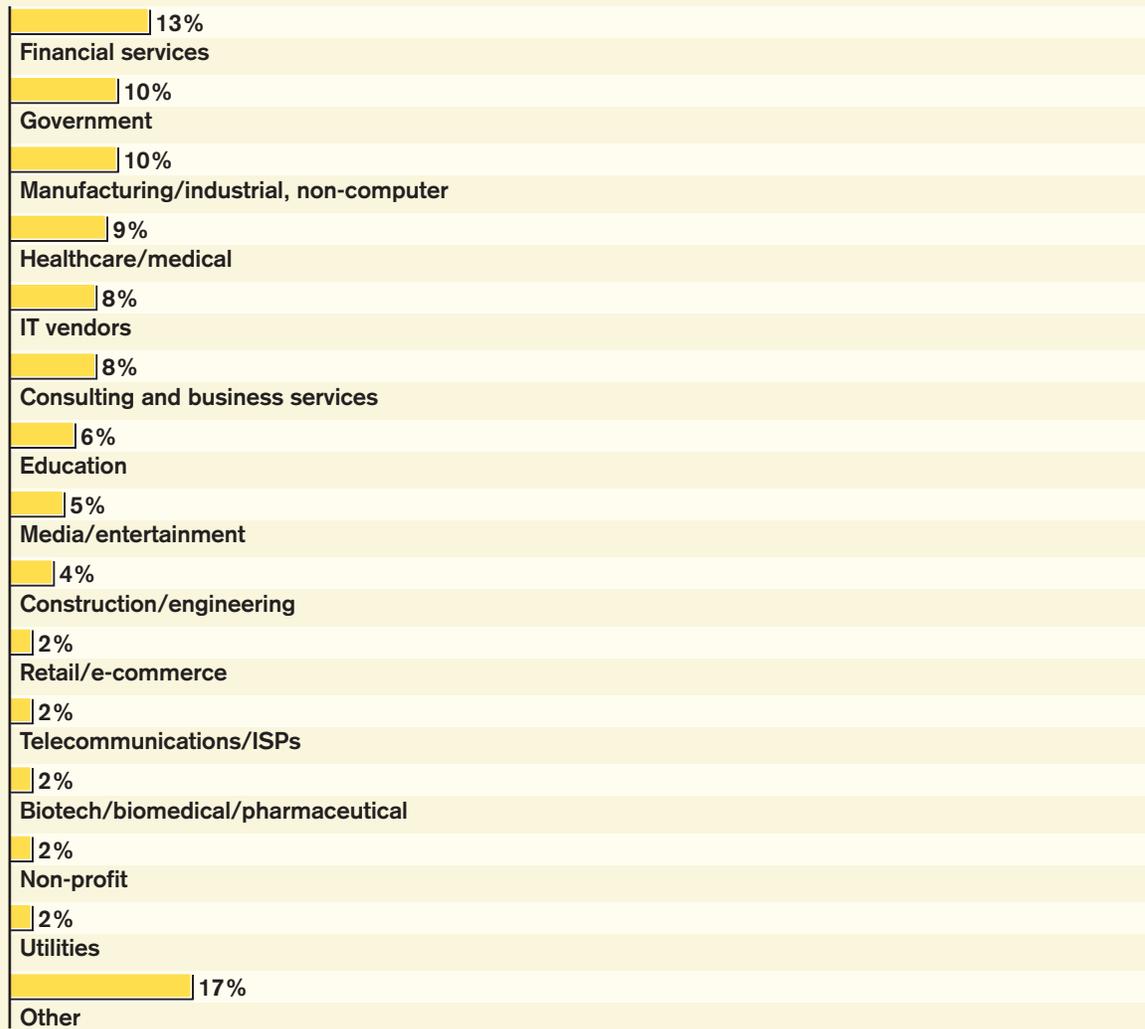


Figure 23

Industry

What is your organization's primary industry?



Data: *InformationWeek* Analytics Virtualization Survey of 348 business technology professionals